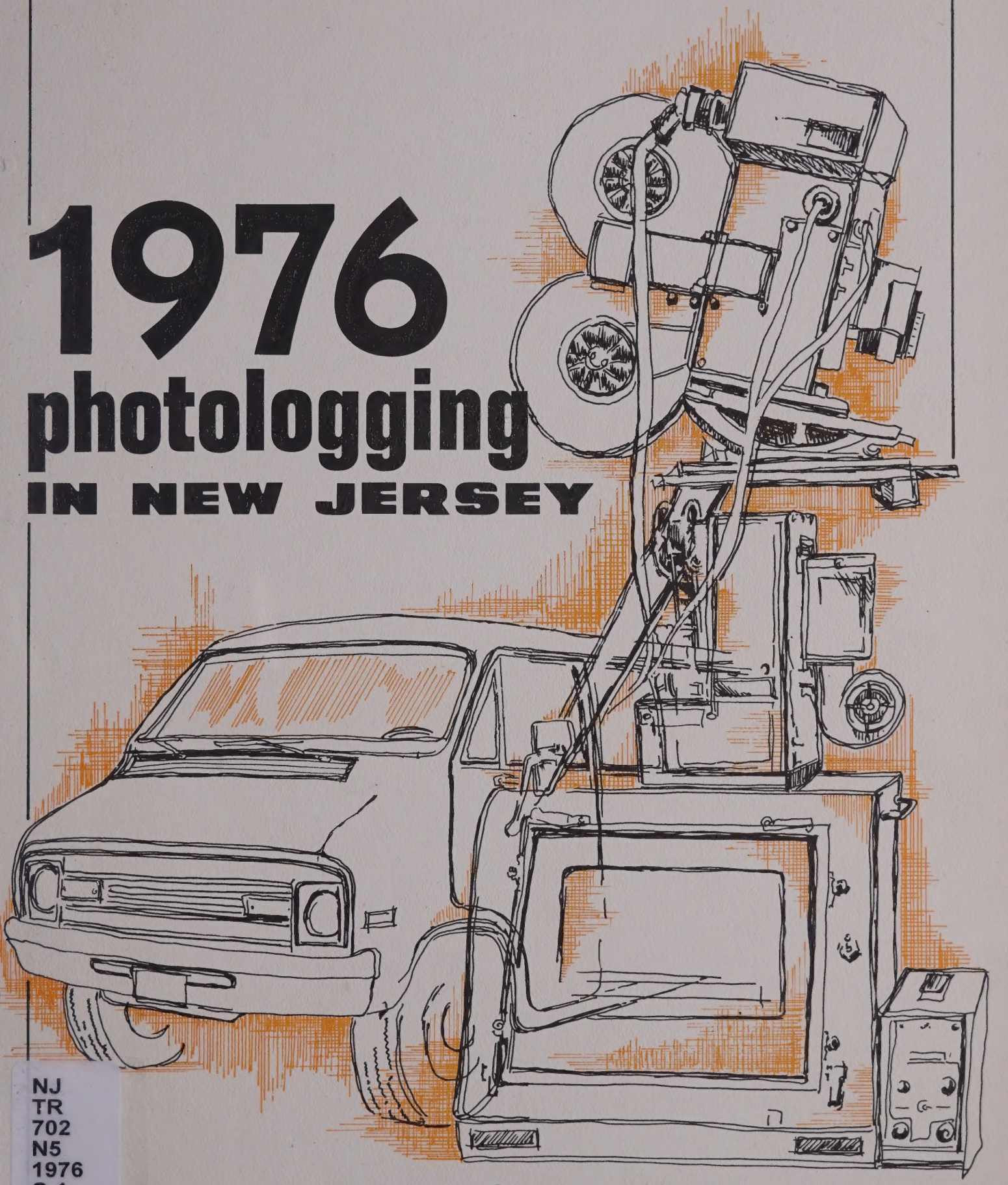
1976 photologging IN NEW JERSEY



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New Jersey Department of Transportation

IN REPLY PLEASE REFER TO

State of New Jersey

DEPARTMENT OF TRANSPORTATION

1035 PARKWAY AVENUE
TRENTON, NEW JERSEY 08625

ALAN SAGNER
COMMISSIONER

Transmitted herewith is a copy of our manual "1976 Photologging in New Jersey". Additional copies are available and may be obtained from the Bureau of Data Resources.

Two film libraries have been established and are being maintained by the Bureau of Data Resources in Room 3300 of the Annex Building, and at the Bureau of Traffic Operations on Scotch Road.

Updating is underway as specified in HPR-PL-1(12).

Particulars regarding Photologging may be directed to:

Mr. James T. Trolle
Bureau of Data Resources
1035 Parkway Avenue
Trenton, New Jersey 08625
Area Code 609 292-7473

Very truly yours,

Joseph C Kanda

Joseph C. Kanda
Chief, Bureau of Data Resources

JCK:jch

Attachment

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Acknowledgment

Special acknowledgment is made to the Federal Highway Administration for making funds available under Section 402(c) of Public Law 89-564 through the State Office of Highway Safety. Their assistance in providing information regarding equipment and techniques relating to photologging and their guidance in the development of this project is greatly appreciated.

PREPARED BY

THE STATE OF NEW JERSEY

DEPARTMENT OF TRANSPORTATION
DIVISION OF COMPREHENSIVE PLANNING

BUREAU OF DATA RESOURCES

IN

COOPERATION WITH THE FEDERAL
HIGHWAY ADMINISTRATION

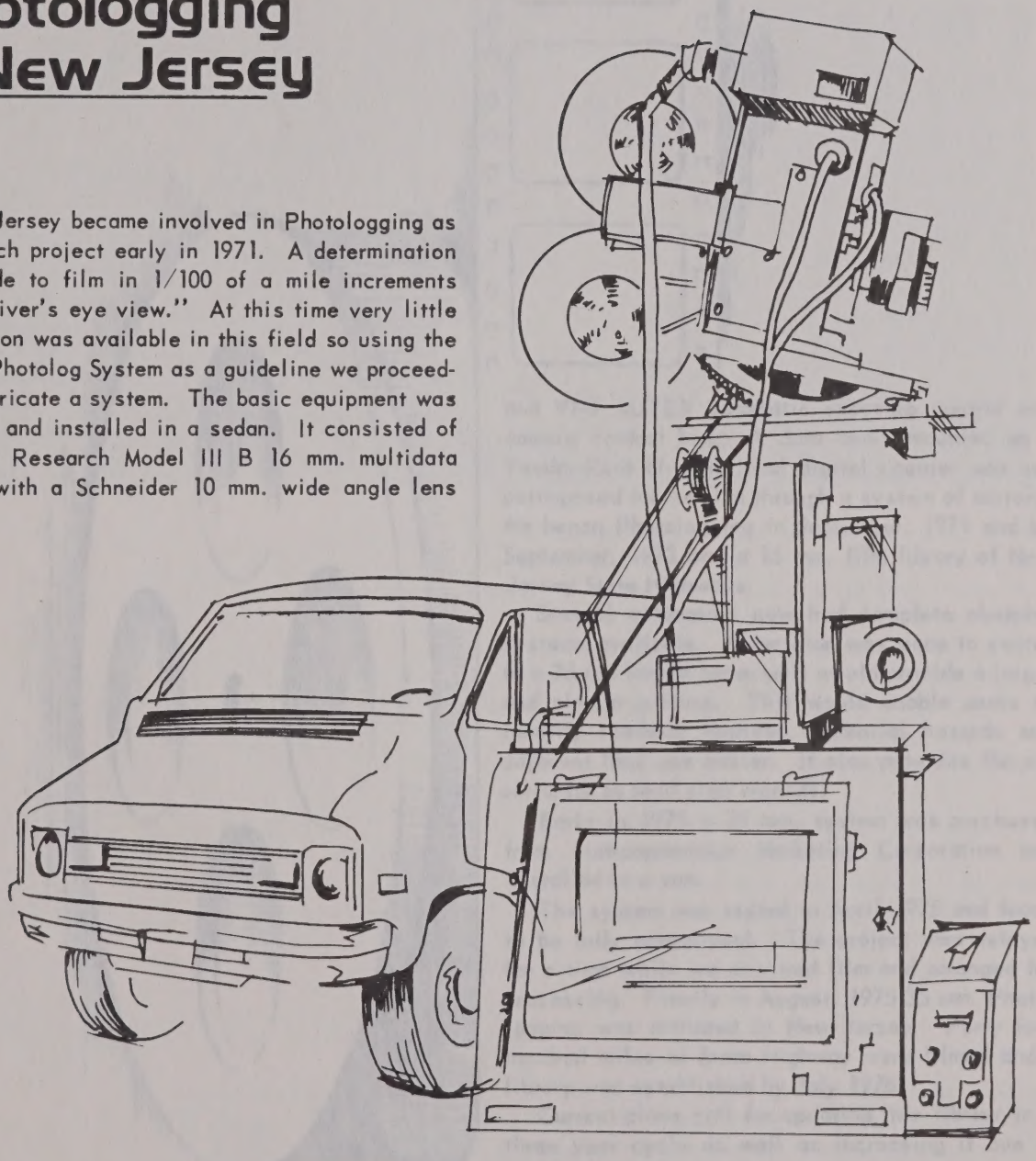
Table of Contents

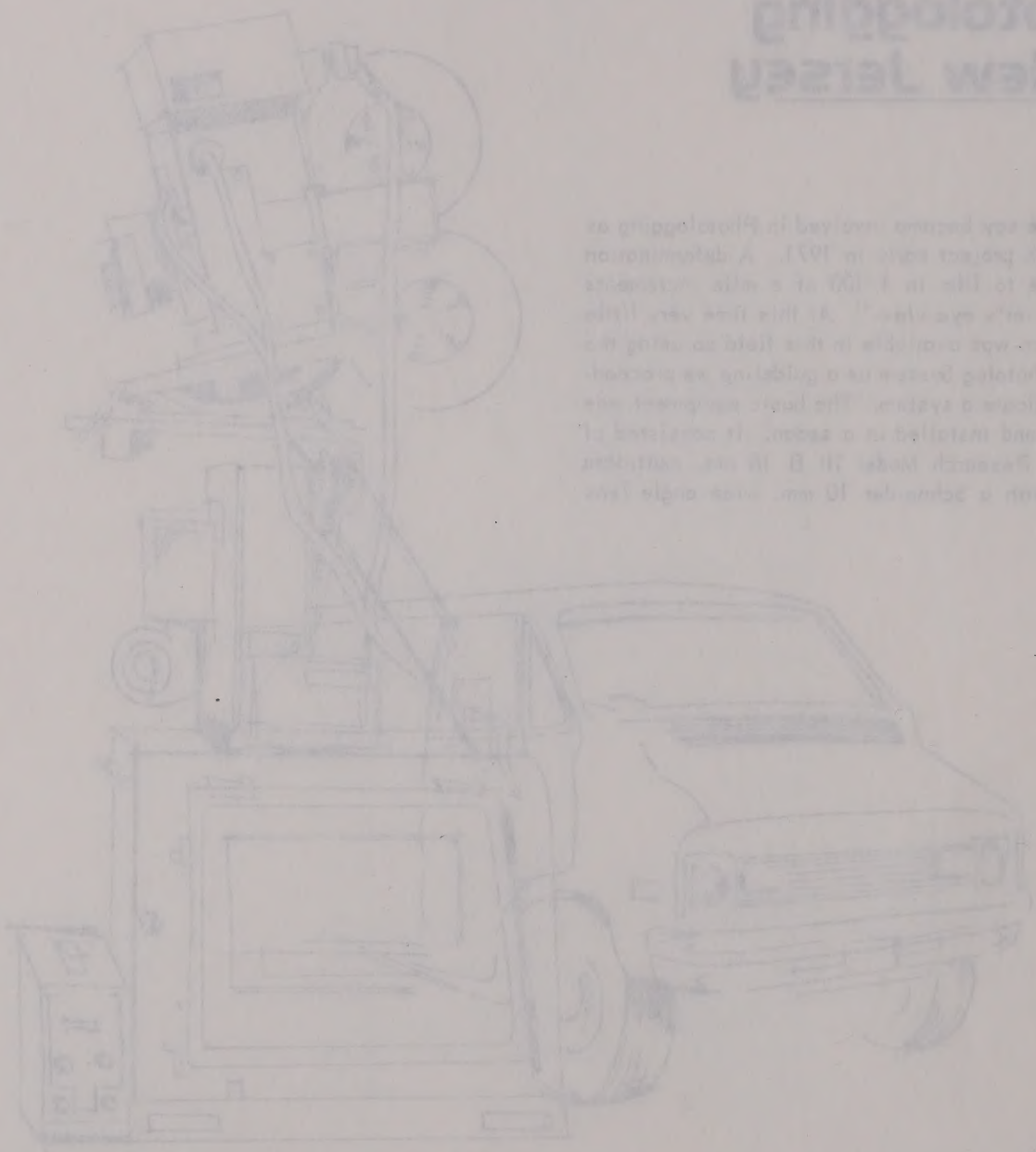
Photologging in New Jersey	*pg. 3*
Uses of Photologging	*pg. 5*
The Vehicle	*pg. 6*
Portable Sign	*pg. 7*
Automax Camera	*pg. 8*
Control Unit	*pg. 9*
(DMI) Distance Measuring Instrument	*pg. 10*
(DEM) Distance Event Marker	*pg. 10*
Unprocessed Film	*pg. 10*
Daily Operation	*pg. 10*
Color Film	*pg. 10*
Developing	*pg. 11*
Film Editing	*pg. 12*
Photolog Projector	*pg. 13*
Photolog Library	*pg. 14*
Scheduling	*pg. 15*
Vehicle & Camera Check Lists	*pg. 15*
Expenditures	*pg. 16*
Recommendations	*pg. 17*

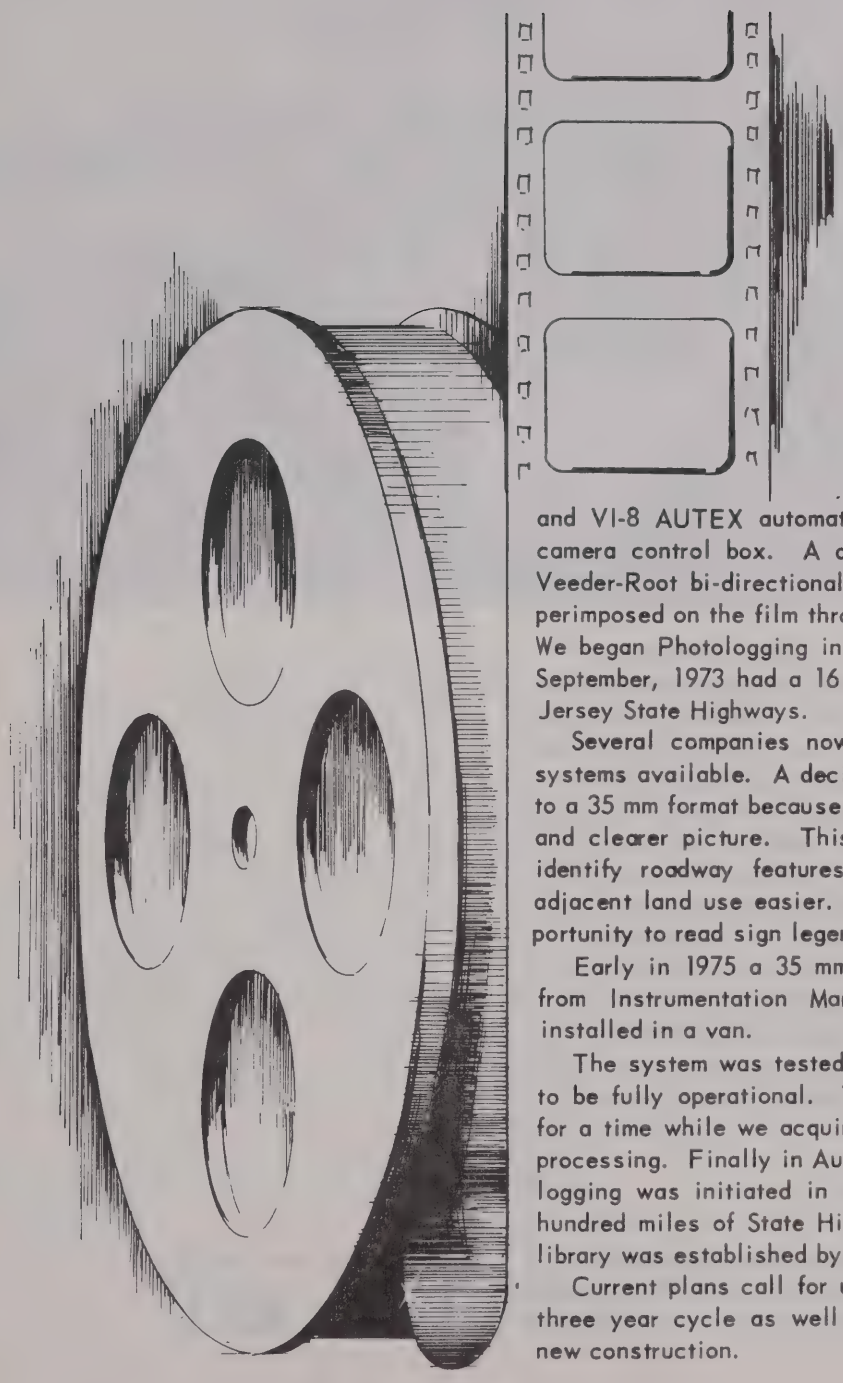
Table of Contents

Photologging in New Jersey

New Jersey became involved in Photologging as a research project early in 1971. A determination was made to film in 1/100 of a mile increments from "driver's eye view." At this time very little information was available in this field so using the Oregon Photolog System as a guideline we proceeded to fabricate a system. The basic equipment was acquired and installed in a sedan. It consisted of a Flight Research Model III B 16 mm. multidata camera with a Schneider 10 mm. wide angle lens







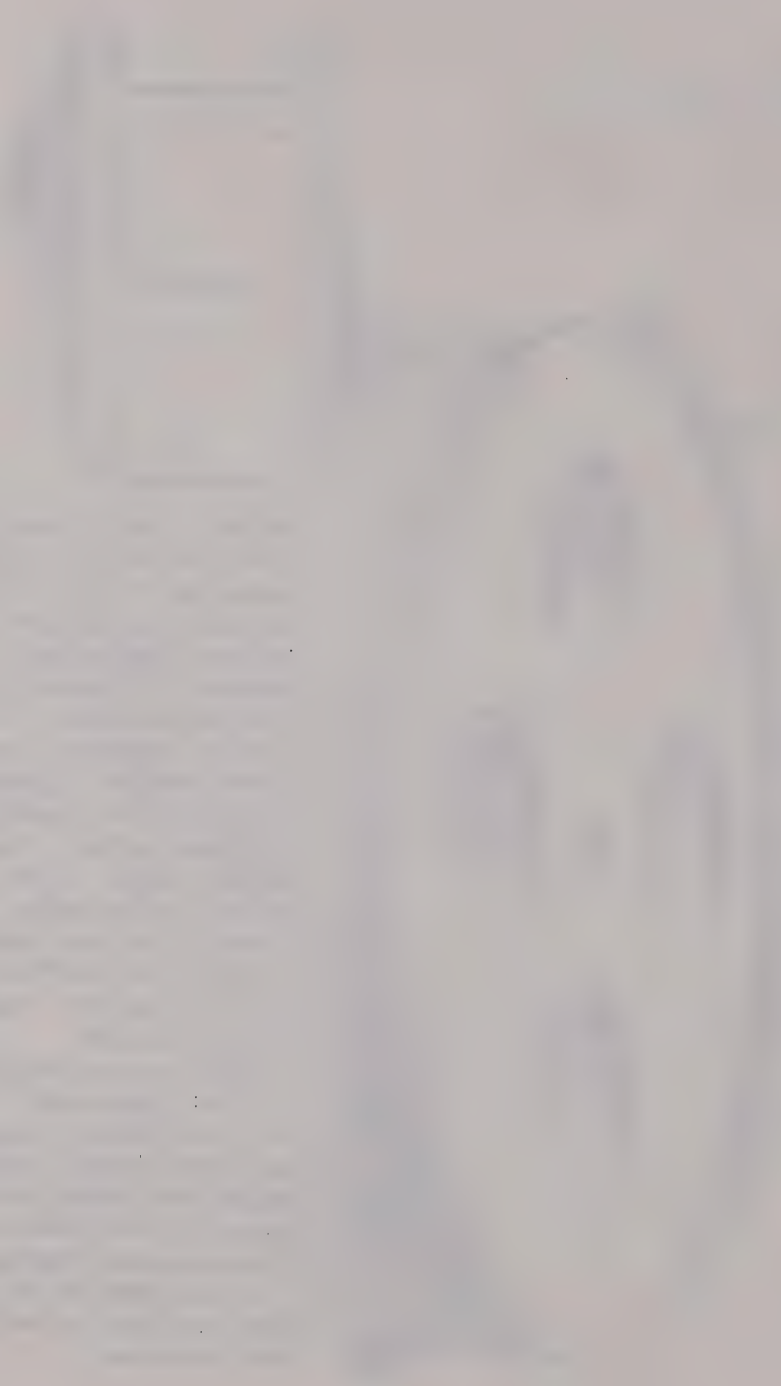
and VI-8 AUTEX automatic exposure control and camera control box. A data board mounted on a Veeder-Root bi-directional digital counter was superimposed on the film through a system of mirrors. We began Photologging in September, 1971 and by September, 1973 had a 16 mm. film library of New Jersey State Highways.

Several companies now had complete photolog systems available. A decision was made to switch to a 35 mm format because it would provide a larger and clearer picture. This would enable users to identify roadway features, potential hazards and adjacent land use easier. It also provides the opportunity to read sign legends.

Early in 1975 a 35 mm. system was purchased from Instrumentation Marketing Corporation and installed in a van.

The system was tested in April 1975 and found to be fully operational. The project was delayed for a time while we acquired film and arranged for processing. Finally in August, 1975 35 mm. Photologging was initiated in New Jersey. Forty four hundred miles of State Highway were filmed and a library was established by July 1976.

Current plans call for updating this library in a three year cycle as well as increasing it due to new construction.



Photologging consists of taking a series of sequential photographs of highways at uniform intervals and establishing a permanent film library for use by planning and operating units of the Transportation Department. It has proven to be a valuable traffic engineering tool. Some of the important uses of the photolog include:

1. Surveillance of high accident locations
2. Inventory and evaluation of traffic control devices
3. Inventory of signs and billboards
4. Location of access points
5. Study of physical characteristics of highways
6. Evaluation of adjacent land use
7. Aid in public relations efforts

The Tool

A Photolog System is comprised of four basic elements. They are the vehicle, the photographic equipment, the film and the viewing equipment.

The Vehicle

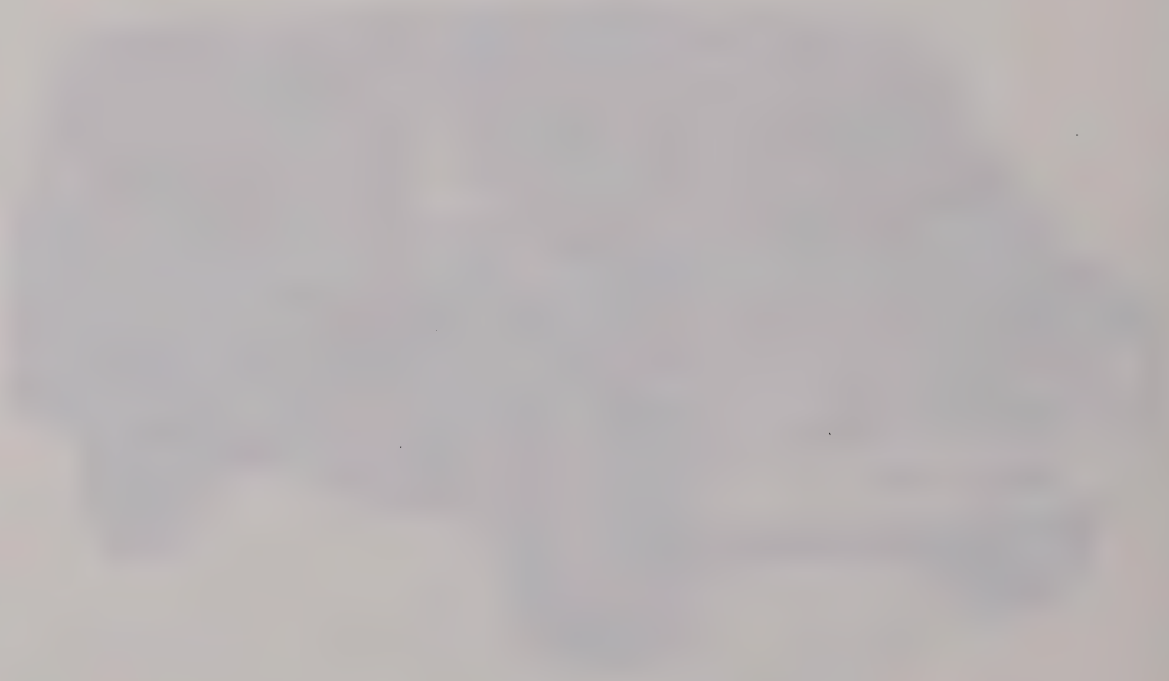
A Dodge compact van, model B-100, was selected for use as the photolog vehicle for the following reasons:

1. A van has no hood thus it cannot appear in the picture nor can it present any problems with glare.
2. The camera can be mounted somewhat higher than "driver's eye view."
3. The windshield is more vertical than in a sedan which helps to minimize distortion.
4. The additional space available is suitable for making a mobile laboratory.

The vehicle was purchased with the following options:

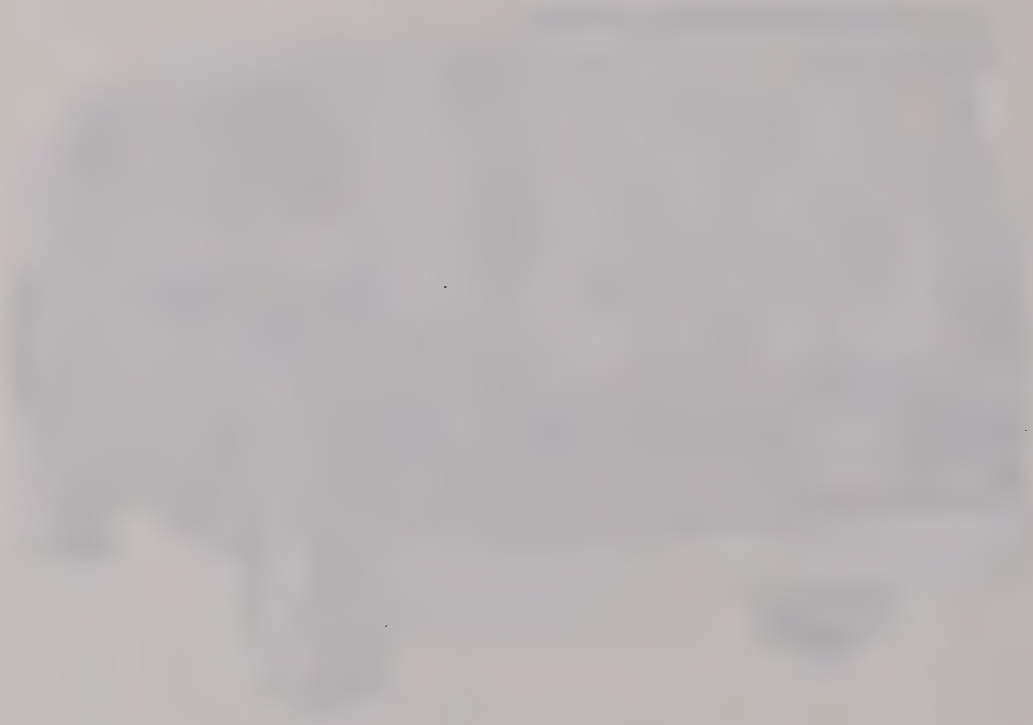
1. Air conditioning - for protection of film and camera.
2. 60 AMP alternator - necessary because of additional electrical equipment.
3. Steel belted radial tires - provides a greater degree of accuracy in the measurement of distance.
4. Heavy duty springs - necessary because of additional weight and helps to minimize bouncing.
5. Untinted windshield - to prevent color imbalance.

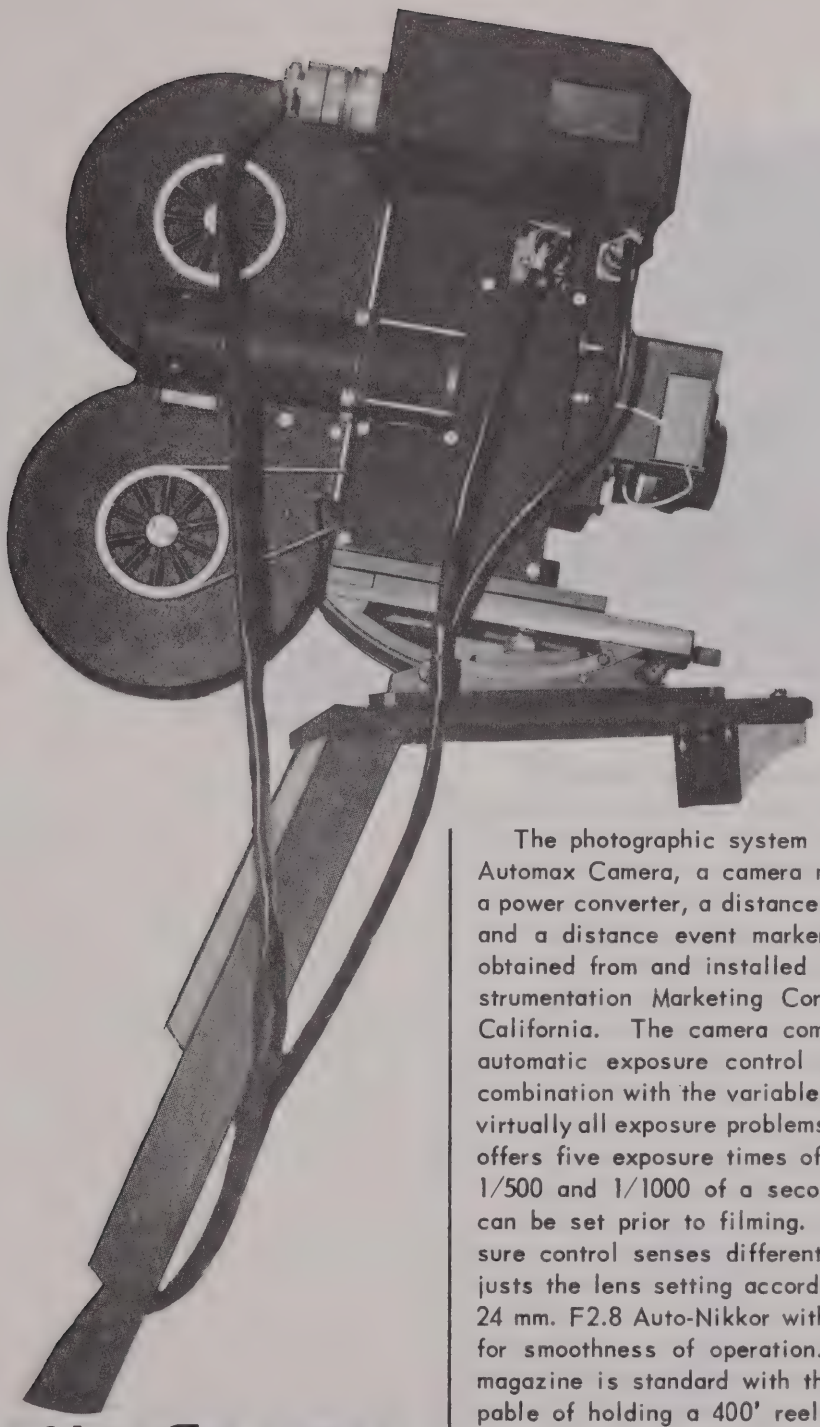
The van was modified by addition of a wooden floor, wall paneling, removable window coverings and a desk and chair bolted to the frame. This was done in order to have a working area but it also insulates the van, provides for control of light level and helps to deaden sound.



Portable Sign

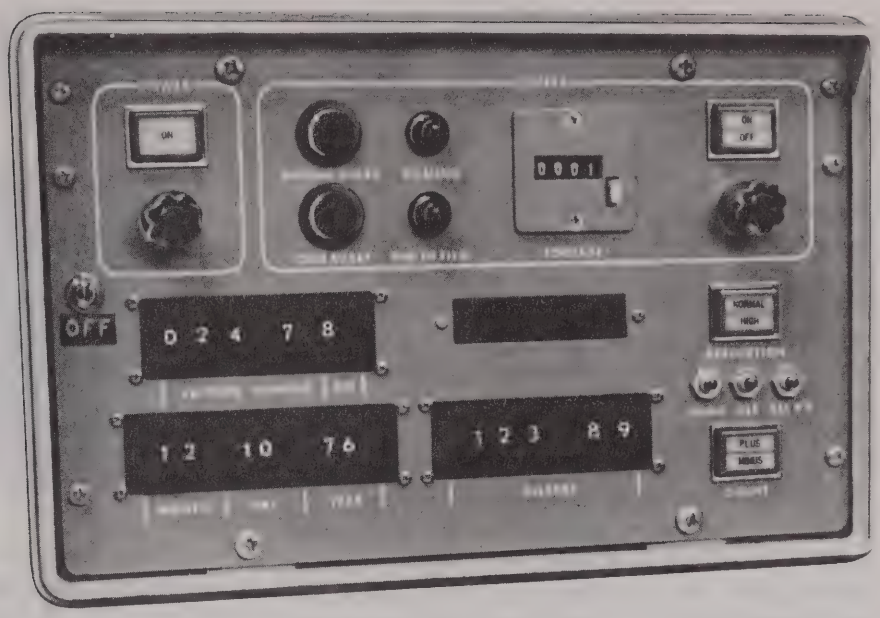
A portable sign was fabricated which can be mounted across the rear of the van to inform the motorist that photologging is in progress and that 200 feet of clearance is necessary in front of the vehicle. Attached to the sign are lights (orange colored) for safety. These are electrically connected and capable of flashing.





35mm Automatic Camera

The photographic system consists of a 35 mm. Automax Camera, a camera mount, a control unit, a power converter, a distance measuring instrument and a distance event marker. This system was obtained from and installed in the vehicle by Instrumentation Marketing Corporation of Burbank, California. The camera comes equipped with an automatic exposure control which when used in combination with the variable speed shutter solves virtually all exposure problems. The variable shutter offers five exposure times of 1/64, 1/125, 1/250, 1/500 and 1/1000 of a second, any one of which can be set prior to filming. The automatic exposure control senses different light levels and adjusts the lens setting accordingly. The lens is a 24 mm. F2.8 Auto-Nikkor with click stops removed for smoothness of operation. The S-4L Mitchell magazine is standard with this camera. It is capable of holding a 400' reel of film which represents approximately 64 miles of filming at 100 frames per mile.

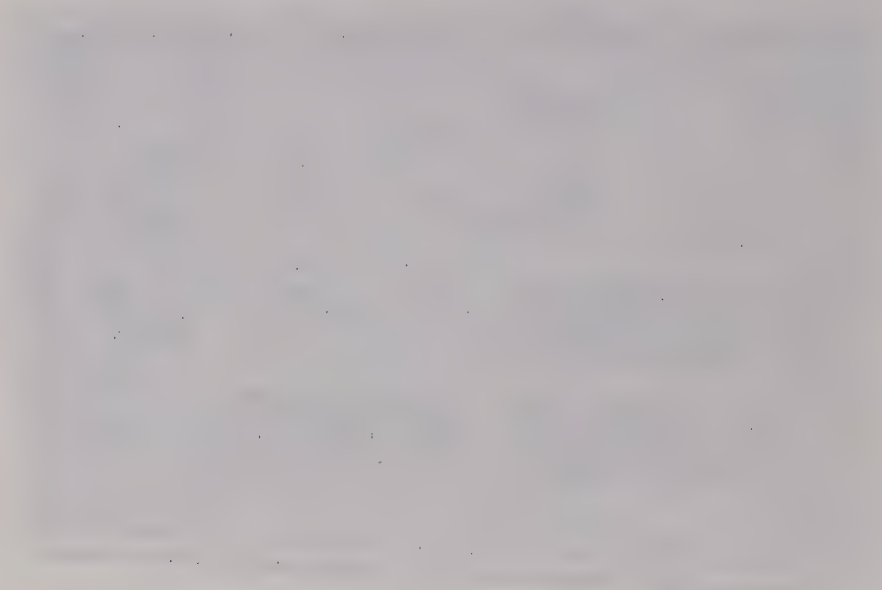


Control Unit

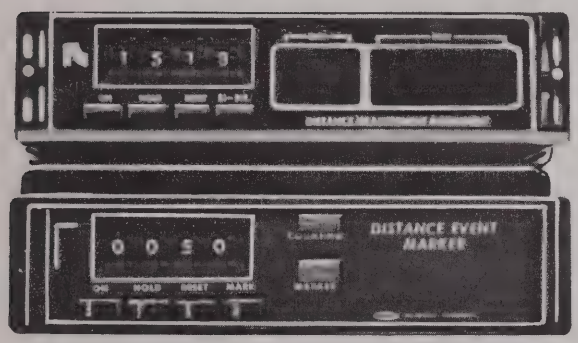
The control unit is housed in a metal case and contains all necessary input and output connectors. The unit controls all camera functions and contains thumb switches for the setting of 15 digits of numerical information and a cardinal compass point. Ten digits are used to identify the route number and date. The other five digits are used for the representation of mileage in hundredths of a mile. All of this information is transmitted to the camera data box where additional information can be added by the insertion of a data slate. This data will be displayed across the bottom of each frame utilizing the full width and approximately 20% of the frame.

Mileage is also displayed on the control unit panel by LEDs identical to those in the camera data box. This allows the operator to verify mileage while photologging.

The camera and control unit are supported by a Winter mount which has been designed for our vehicle. The mount includes a quick release mechanism and is adjustable both horizontally and vertically. The support bracket is easily removable to provide access to the engine.



Dmi-Dem



The Distance Measuring Instrument (DMI) and the Distance Event Marker (DEM) were mounted on the dashboard in such a position that they can be easily seen by the operator at all times. The 12V to 28V D.C. power converter is bolted to the floor behind the driver's seat. These are connected to the back of the control unit by wire cables.

The (DMI) senses the presence of a series of magnetic targets on one wheel of the vehicle. By driving a pre-measured distance several times a program number is determined for the specific vehicle. This number when dialed into the instrument will provide true distance read-out in the display window and when calibrated properly is accurate to one foot per mile. In order to insure this degree of accuracy it is essential that calibration be verified relatively often.

The (DEM) monitors the mileage accumulated by the DMI and is programmed to provide an electric impulse every one hundredth of a mile which will trigger the camera.

The power converter supplies the necessary 28 volts DC to the system from the 12V vehicle power. It contains a heavy duty circuit breaker to provide complete protection to the entire system from electrical damage.

The Film

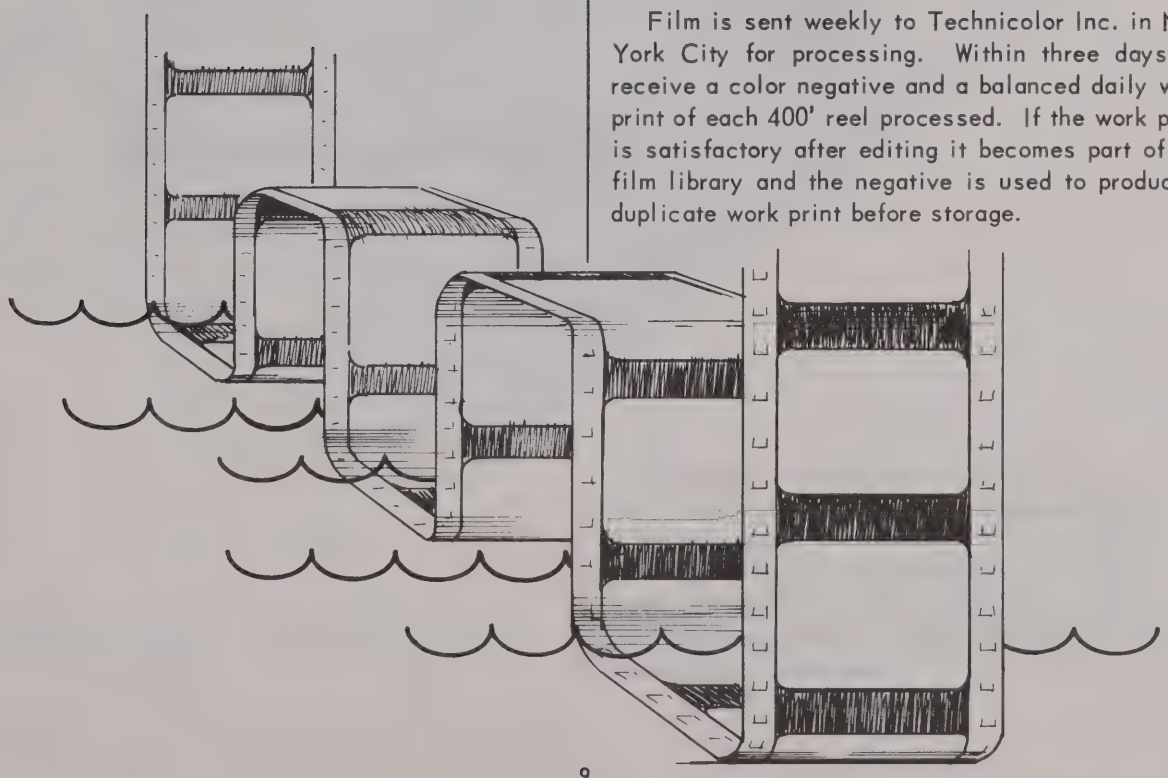
It was decided to use Eastman Kodak Color Negative film 5247 which is suitable for daylight use with a number 85B filter. The ASA rating of the film is 64 using this filter. This film is available in several lengths. The 400' reel is best suited for photologging. Anything smaller would require too many magazine changes and anything larger would exceed the capacity of our projectors as well as present storage problems. Each 400' reel represents 60-64 miles of road.

The unprocessed film is sensitive to heat if subjected to it for an extended period of time. Film also has a shelf life. For this reason a 14 cubic foot refrigerator was purchased for storage both before and after exposure. The refrigerator can hold one hundred reels of film. This allows purchases and shipments of larger quantities which is more economical. Film removed for subsequent usage is kept in an insulated chest for protection even though the vehicle is air conditioned.

The field crew assigns a number to each negative reel of film just prior to usage. This number is cross-indexed with the daily operation sheet and the route numbers by mileposts. Consecutive numbers beginning with one and prefaced by the fiscal year in which filming takes place (e.g. 76-1) is the current sequence. Once assigned, this number will remain with the color negative. These are stored in metal cabinets.

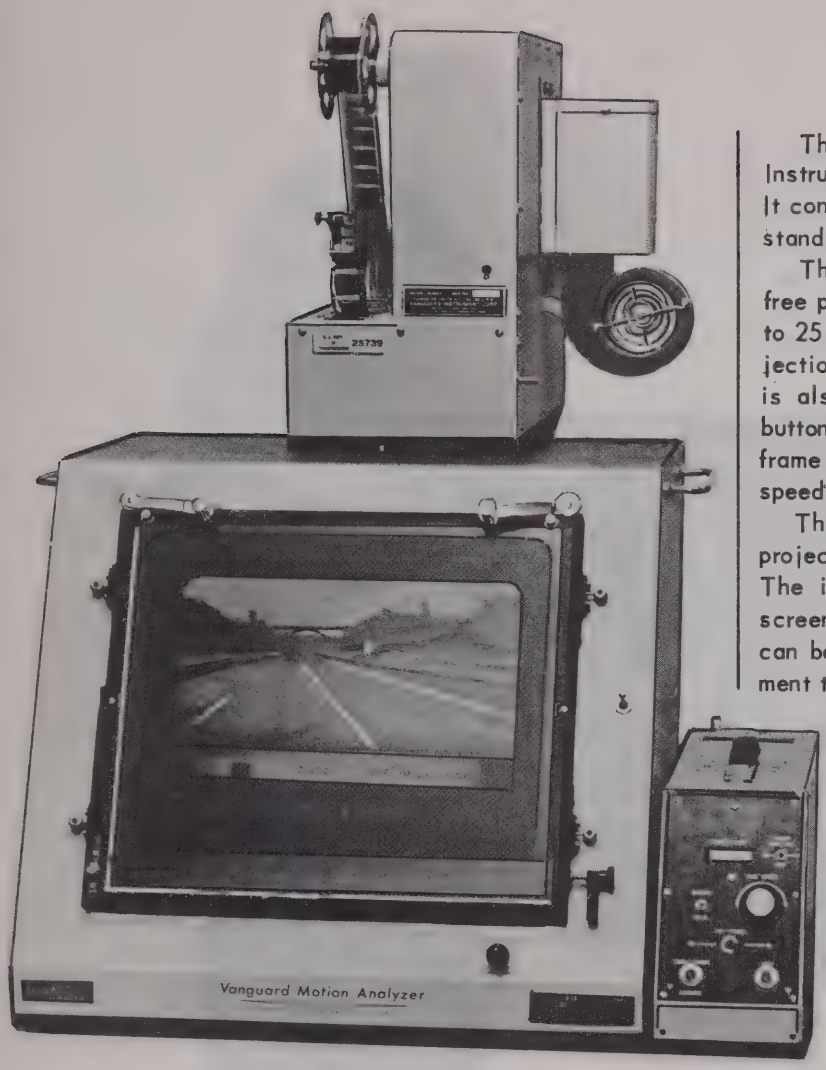
Developing

Film is sent weekly to Technicolor Inc. in New York City for processing. Within three days we receive a color negative and a balanced daily work print of each 400' reel processed. If the work print is satisfactory after editing it becomes part of the film library and the negative is used to produce a duplicate work print before storage.



Film Editing

Film editing consists of inspecting all processed film in order to evaluate color, exposure, accuracy of the legend and picture content. At this time notations are made to determine which segments are to be scheduled for reshooting. These segments are assigned a priority number and the reason for the priority is indicated.



The viewing system was acquired from Vanguard Instrument Corporation of Melville, Long Island. It consists of a projection head with two projection stands and a control box with a remote unit.

The Model M-35CF projector provides flicker free projection from less than one frame per second to 25 frames per second forward and reverse. Projection speed is controlled by rheostat but the unit is also capable of single frame advance by push button. It is also equipped with a bi-directional frame counter, a stop action button effective at any speed and a high speed rewind mode.

The Model S-13 projection stand provides a rear projected image on a 13''H x 15''W viewing screen. The image is formed on the outer surface of the screen so that direct measurements and overlays can be made. The image may be shifted for alignment to a fixed base line.

Photolog Projector

The S-1 projection stand is for wall or screen projection. It encloses a first surface mirror that directs the light path horizontally and is equipped with leveling feet. The 3'' focal length lens provides for image projection 3'H x 4'W at a distance of 12'.

Currently on order is the PL-35 35 mm. Photolog Projector that has all the capabilities of the 35CF but can be converted from film viewer to screen projector by simply tilting a mirror in or out of the light path. In addition it is simpler to operate and is more portable.

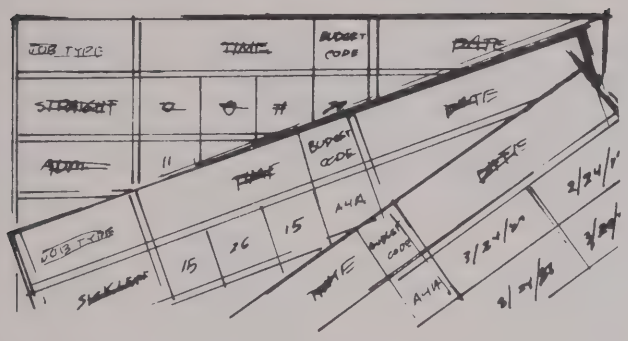
Photolog Library

The library consists of film which has been edited and accepted. It is cut to 100' lengths & leaders are spliced to each end. It is put onto 100' plastic reels. Each reel is then labeled with a real number which is cross-indexed with the Route number by the beginning and ending milepost. Notations are made on each reel regarding the order of storage. This occurs whenever two or more short routes are stored on the same reel and facilitates retrieval. Each reel contains 15-17 miles of road.

Reels are stored in metal cabinets with 50 reels in each drawer. Prominently displayed on each drawer are the reel numbers.

The updating of prints will be done on a 100' reel basis whenever possible. The new reel will be assigned the same number as the one to be replaced. However, a letter (A,B, etc.) will be added to denote a different year of filming. It will be filed directly behind the original to maintain historical or chronological order.

Scheduling



The standard photologging work day begins at 8:30 a.m. and ends at 5:00 p.m. Monday thru Thursday. Fridays and bad weather days are reserved for office work such as splicing and editing. This also allows time to load the van with working materials. Any maintenance work to be done on the van will also be done on these days.

The size of New Jersey permits the photologging crew to work any part of the state and return to the central office after each day of filming.

The photologging crew consists of two men, an operator and a driver. These two men have been cross-trained so that each can conduct the other's functions. The operator will be responsible for the operation of the camera, loading and unloading the film magazines, maintaining the daily forms, and scheduling of the day's photo runs. The driver will be responsible for the proper maintenance and care of the van. Also he will be responsible for the safe operation of the vehicle.

The same two men will be responsible for the splicing and editing of processed film and the maintenance of the film library and office records.

On a typical work day the crew will load their equipment, check the vehicle and then leave for their work assignment. On the way to the job they will calibrate the distance measuring instrument by riding over a test course of a known distance.

Upon arrival at the job site the necessary preparations will be made for filming. The camera will be mounted and the film will be loaded into the camera. The caution sign will be mounted on the rear of the van and the windshield will be cleaned. All of the necessary electrical connections will be made. The operator will insert the data slate in the camera head and dial all necessary information into the control box. The driver and operator together will go over the following photologging check list:

1. Distance measuring instrument on and properly set.
2. Distance event marker on and properly set.
3. Lens cap off and filter on snugly.
4. Lens focused on infinity.
5. Is data slate correct and inserted properly.
6. Turn power "ON".
7. Automatic exposure control operating.
8. Check electrical connections.
9. Verify control unit settings.
10. Load data to camera and manually move 30 frames forward.
11. Synchronize the camera with the DMI & DEM and then start filming.

The actual photologging is done in 15-17 mile increments if the route is of sufficient length. Eight blank frames are provided for between increments. This provides space at the ends of the increments for splicing without loss of any good film. Physical landmarks are preferable for use as increment breaks because they are not movable. as is the case with milepost markers.

At completion of the days work the camera is dismounted and stored in a cool dry place.

Expenditures

Expenditures in the amount of $67,580 were incurred in the production of a complete 35 mm. film library. This includes purchase of the vehicle, photographic and viewing equipment, purchase and processing of film, acquisition of certain necessary incidentals and salary. These expenditures were applied against funds made available by federal grants obtained under Section 402 (c) of Public Law 89-564. State matching funds were provided by personnel services in the Department of Transportation's Division of Planning. The cost of filming was approximately $15 per one-way mile.

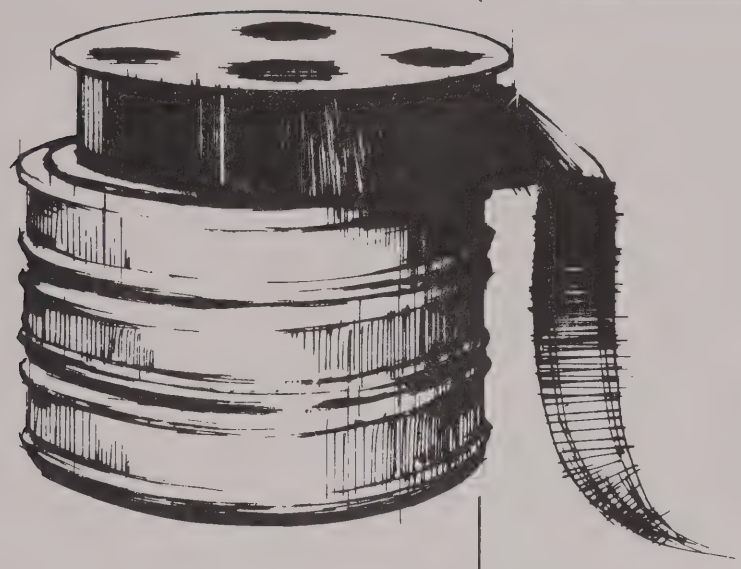
It is anticipated that cost of a complete rerun of the 4400 miles will cost approximately $5 per one-way mile since equipment is already paid for and maintenance costs are minimal.

Provisions have been made to establish a duplicate film library at a cost of approximately $15,000.

INITIAL COSTS

Vehicle	3,582.45
Photographic equipment	12,154.45
Viewing equipment	10,414.15
Purchase of film	7,745.00
Processing of film	4,474.83
Incidentals	880.45
Salary	28,328.57
	$67,580.00

Recommendations



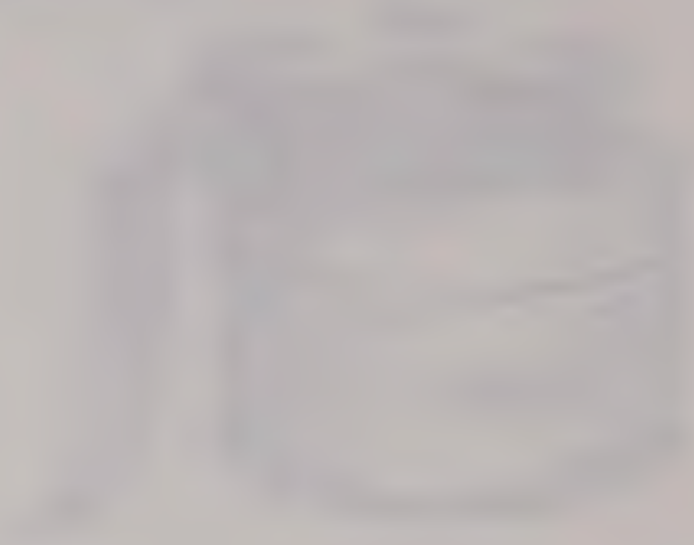
Indications are that carrying the following equipment in the photolog vehicle will greatly reduce delays:

1. Spare spring and pulley for camera take-up are subject to wear.
2. Magnetic targets and glue for DMI.
3. Tools to make minor repairs and adjustments.
4. Changing bag for loading of film in the vehicle.
5. Labels for permanent marking of reels of film.

Double check that all electrical connections are proper and snug.

Insure that film is being taken up properly by removing the lower cover of the magazine. Film should be wound around the core.

Some difficulty has been experienced with lens flare when filming with the sun on the right and almost overhead. This appears on film as a red hexagon. The problem has not been solved but we feel it may be correctable by using a filter.



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